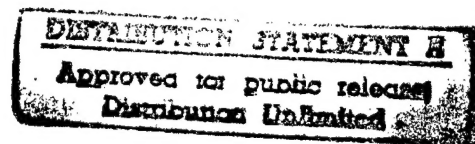


FINAL
SOURCE REMOVAL REPORT
FOR THE REMEDIATION OF CONTAMINATED SOILS
AT THE OLD BURN AREA (SITE 11)

SAVANNAH AIR NATIONAL GUARD BASE
SAVANNAH INTERNATIONAL AIRPORT
SAVANNAH, GEORGIA

VOLUME I

JULY 1997



19970912 159

(DTIC QUALITY INSPECTED 3)

| REPORT DOCUMENTATION PAGE | | | Form Approved OMB No. 0704-0188 | |
|---|---|--|---|--|
| <small>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.</small> | | | | |
| 1. AGENCY USE ONLY (Leave blank) | | 2. REPORT DATE July 1997 | | 3. REPORT TYPE AND DATES COVERED Source Removal |
| 4. TITLE AND SUBTITLE Source Removal Report for the Remediation of Contaminated Soils at the Old Burn Area (Site 11), Savannah Air National Guard Base, Savannah International Airport, Savannah, Georgia | | | 5. FUNDING NUMBERS | |
| 6. AUTHOR(S) NA | | | | |
| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) PEER Consultants, P.C. 575 Oak Ridge Turnpike Oak Ridge, Tennessee 37830 | | | 8. PERFORMING ORGANIZATION REPORT NUMBER | |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) ANG/CEVR 3500 Fetchet Avenue Andrews AFB MD 20762-5157 | | | 10. SPONSORING/MONITORING AGENCY REPORT NUMBER | |
| 11. SUPPLEMENTARY NOTES | | | | |
| 12a. DISTRIBUTION AVAILABILITY STATEMENT Approved for public release: distribution is unlimited. | | | 12b. DISTRIBUTION CODE | |
| 13. ABSTRACT (Maximum 200 words) Approximately 11,000 tons of petroleum contaminated soil was removed and treated at Site 11, as part of the ongoing Installation Restoration Program (IRP) activities. The contaminated soil was removed and transported to the Soil Safe, Inc. Treatment facility in Savannah, located within 2 miles of the site. Excavations were backfilled with clean soil and the site restored using sod and seed. No further significant source area exists at Site 11 and no additional soil remediation is recommended. | | | | |
| 14. SUBJECT TERMS | | | 15. NUMBER OF PAGES | |
| | | | 16. PRICE CODE | |
| 17. SECURITY CLASSIFICATION OF REPORT | 18. SECURITY CLASSIFICATION OF THIS PAGE | 19. SECURITY CLASSIFICATION OF ABSTRACT | 20. LIMITATION OF ABSTRACT | |

**FINAL
SOURCE REMOVAL REPORT
FOR THE REMEDIATION OF CONTAMINATED SOILS
AT THE OLD BURN AREA (SITE 11)**

**SAVANNAH AIR NATIONAL GUARD BASE
SAVANNAH INTERNATIONAL AIRPORT
SAVANNAH, GEORGIA**

JULY 1997

Prepared by

**PEER Consultants, P.C.
575 Oak Ridge Turnpike
Oak Ridge, Tennessee 37830**

**Prepared for the
Air National Guard/CEVR
under National Guard Bureau
Contract DAHA90-94-D-0011**

DTIC QUALITY INSPECTED 3

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

| | <u>Page</u> |
|---|-------------|
| 1.0 INTRODUCTION..... | 1-1 |
| 2.0 BACKGROUND..... | 2-1 |
| 3.0 SOURCE REMOVAL REQUIREMENTS..... | 3-1 |
| 4.0 REMEDIATION ACTIVITIES..... | 4-1 |
| 4.1 GENERAL SITE ACTIVITIES..... | 4-1 |
| 4.2 EXCAVATION AND BACKFILLING OF PIT NO. 1 | 4-1 |
| 4.3 EXCAVATION AND BACKFILLING OF PIT NO. 2 | 4-6 |
| 4.4 OFF-SITE SOIL TREATMENT AND DISPOSAL | 4-9 |
| 4.5 SITE RESTORATION ACTIVITIES..... | 4-9 |
| 4.6 FINAL SITE INSPECTION | 4-10 |
| 5.0 ANALYTICAL LABORATORY RESULTS..... | 5-1 |
| 5.1 PIT NO. 1..... | 5-9 |
| 5.1.1 Perimeter Sampling - Pit No. 1 | 5-7 |
| 5.1.2 Pit Floor Sampling - Pit No. 1..... | 5-17 |
| 5.2 PIT NO. 2..... | 5-17 |
| 5.2.1 Perimeter Sampling - Pit No. 2 | 5-18 |
| 5.2.2 Pit Floor Sampling - Pit No. 2..... | 5-20 |
| 5.3 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES | 5-20 |
| 6.0 CONCLUSIONS AND RECOMMENDATIONS..... | 6-1 |
| 7.0 REFERENCES..... | 7-1 |

APPENDICES (VOLUMES II AND III)

| | |
|---|--|
| A | NON-HAZARDOUS MATERIALS MANIFESTS |
| B | BACKFILL COMPACTION TESTING RESULTS |
| C | CERTIFICATE OF RECYCLE |
| D | ASPHALTIC SEED EMULSION SPECIFICATION |
| E | FINAL INSPECTION MEETING MINUTES |
| F | ACCEPTANCE LETTER FROM GULFSTREAM AEROSPACE CORPORATION (JUNE 9, 1997) |
| G | ANALYTICAL LABORATORY DATA |

LIST OF FIGURES

| | | <u>Page</u> |
|------------|---|-------------|
| Figure 1.1 | Base Location Map | 1-2 |
| Figure 1.2 | Site Map | 1-3 |
| Figure 4.1 | Pit No. 1 Soil Sampling Locations | 4-3 |
| Figure 4.2 | Pit No. 1 Soil Probe Sampling Locations | 4-4 |
| Figure 4.3 | Pit No. 2 Soil Sampling Locations | 4-8 |
| Figure 5.1 | TPH Analytical Results - Pit No. 1 Perimeter Sampling | 5-11 |
| Figure 5.2 | Other Analytical Results - Pit No. 1 Perimeter Sampling | 5-12 |
| Figure 5.3 | Analytical Results - Soil Probe Sampling at Pit No. 1 | 5-15 |
| Figure 5.4 | Analytical Results - Pit No. 2 Perimeter Sampling | 5-19 |

LIST OF TABLES

| | | |
|-----------|--|-----|
| Table 5.1 | Pit No. 1 Analytical Data Summary | 5-2 |
| Table 5.2 | Pit No. 1 Analytical Results - Semivolatile Organic Compounds Data | 5-4 |
| Table 5.3 | Pit No. 1 Geoprobe Soil Sampling - Analytical Data Summary | 5-5 |
| Table 5.4 | Pit No. 2 - Analytical Data Summary | 5-6 |
| Table 5.5 | QA/QC Samples - Analytical Data Summary | 5-7 |

ACRONYMS AND ABBREVIATIONS

| | |
|------|---|
| AER | Abatement and Environmental Resources, Inc. |
| ANG | Air National Guard |
| BGS | below ground surface |
| EPA | Environmental Protection Agency |
| NGB | National Guard Bureau |
| IRP | Installation Restoration Program |
| PAH | polynuclear aromatic hydrocarbons |
| PID | photoionization detector |
| PEER | PEER Consultants, P.C. |
| TPH | total petroleum hydrocarbons |

THIS PAGE INTENTIONALLY LEFT BLANK

DRAFT
SOURCE REMOVAL REPORT
FOR THE REMEDIATION OF CONTAMINATED SOILS
AT THE OLD BURN AREA (SITE 11)

SAVANNAH AIR NATIONAL GUARD BASE
SAVANNAH INTERNATIONAL AIRPORT
SAVANNAH, GEORGIA

1.0 INTRODUCTION

This Source Removal Report summarizes the petroleum-contaminated soil removal activities conducted at the Old Burn Area (Site 11), previously used by the Georgia Air National Guard (ANG) as a fire training area. The Burn Area is located near the Georgia Air National Guard Base, Savannah, Georgia, on property currently owned by the Gulfstream Aerospace Corporation (Figures 1.1 and 1.2).

The Source Removal Project consisted of:

- The excavation of 11,481 tons of petroleum contaminated soils;
- The removal of an abandoned 2-in. diameter pipeline in the excavated area;
- Field screening of soil samples using a photoionization detector (PID) to assist in determining the extent of the excavation,
- Collection of excavation perimeter and pit floor soil samples for laboratory analysis to confirm that the soil excavation met the cleanup objectives;
- Transportation and off-site treatment of contaminated soils by soil cement incorporation;

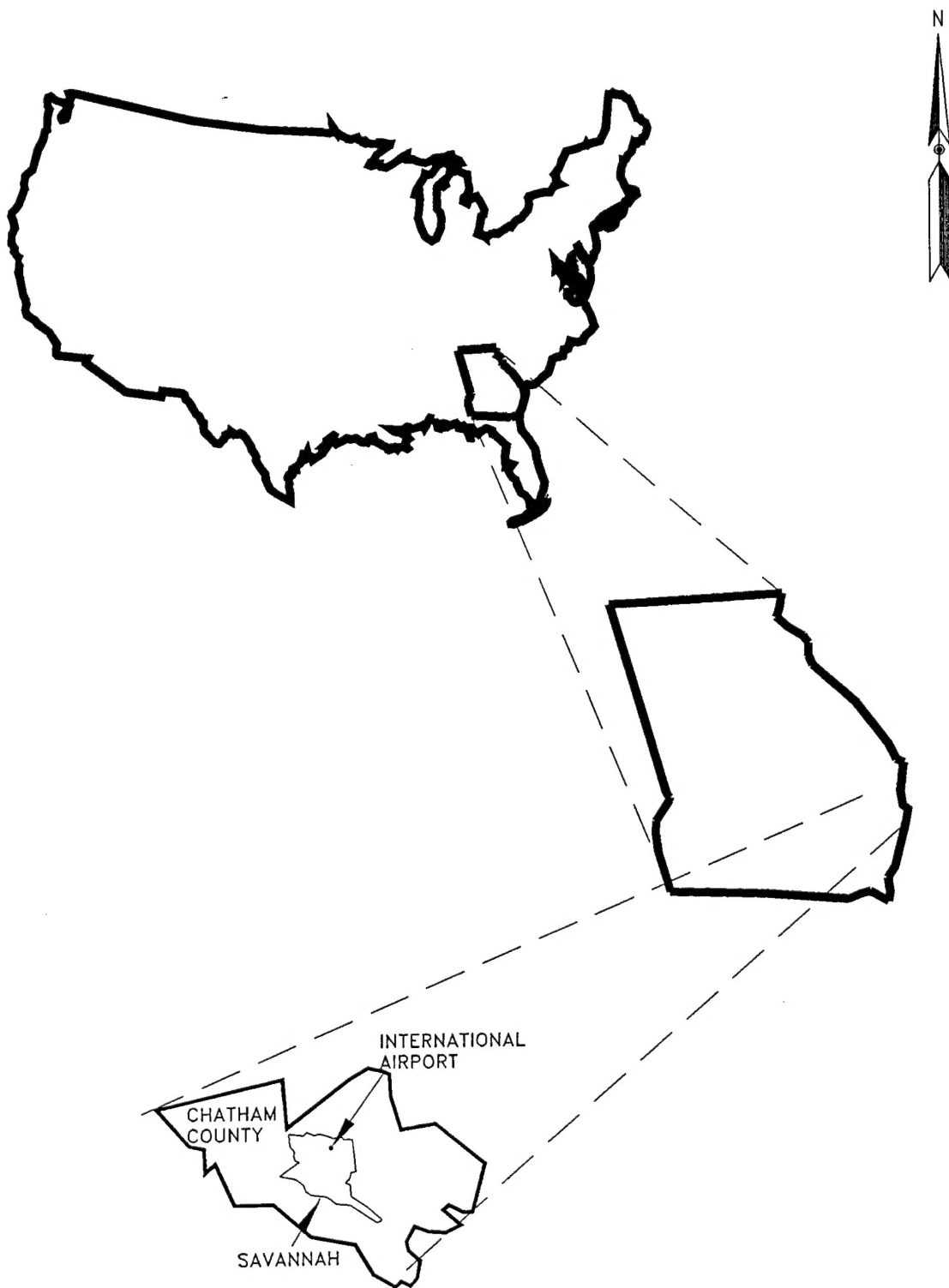
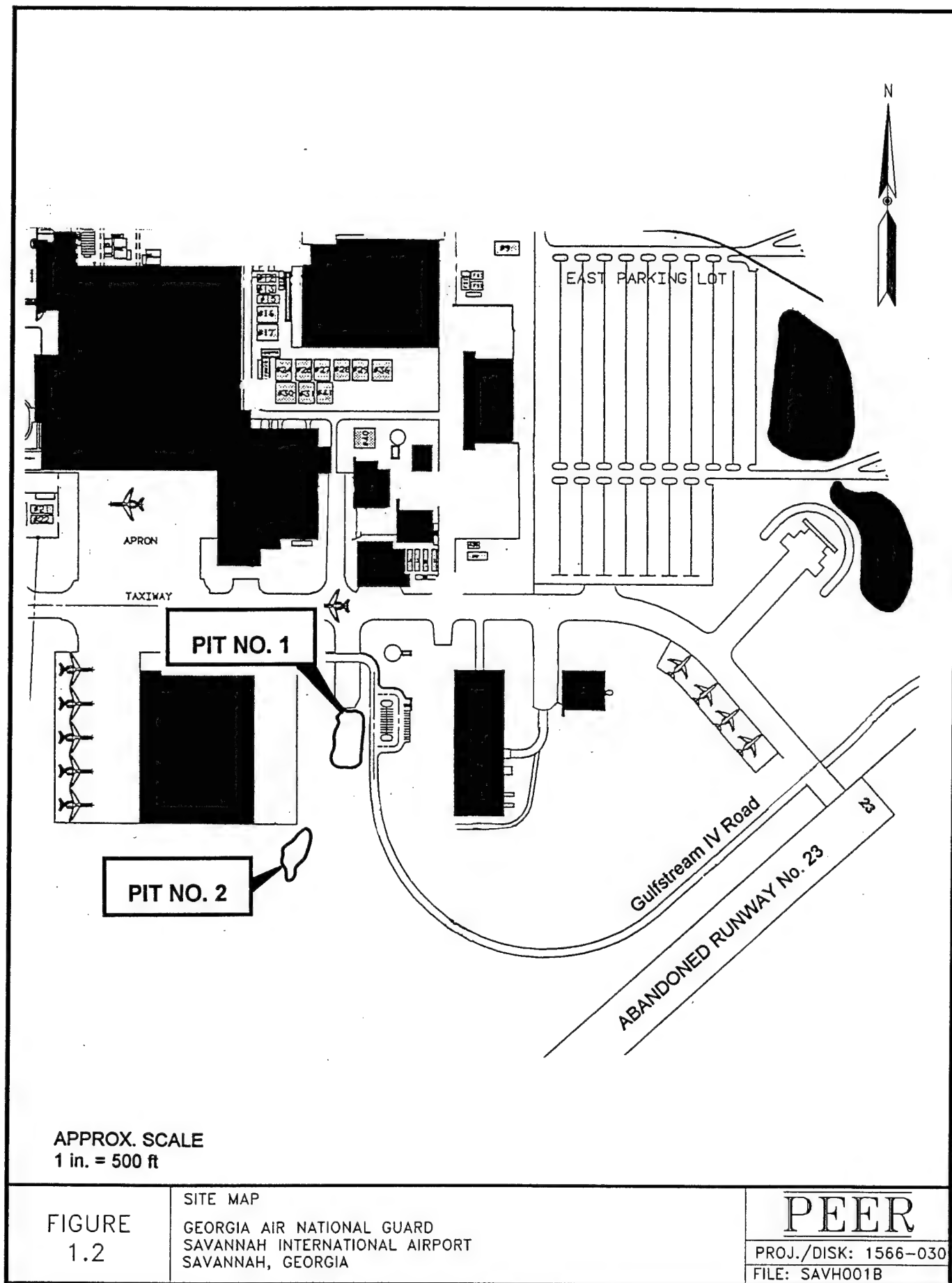


FIGURE
1.1

BASE LOCATION MAP
GEORGIA AIR NATIONAL GUARD
SAVANNAH INTERNATIONAL AIRPORT
SAVANNAH, GEORGIA

PEER

PROJ./DISK: 1566-030
FILE:SAVH001Z



- Backfilling the excavation with clean fill; and,
- Restoring the site with sod or seeding.

The Source Removal Project did not include groundwater remediation.

Soil removal and treatment activities were conducted under National Guard Bureau (NGB) Contract DAHA90-96-D-0001, Delivery Order No. 0002 by Abatement Environmental Resources, Incorporated (AER). Subcontractors to AER included Operational Technologies Corp. (OpTech), Soil Safe, Inc., and Savannah Analytical Services/Specialized Assays, Inc.

PEER Consultants, P.C. (PEER), provided independent surveillance and oversight of the source removal activities for the ANG and prepared the Source Removal Report (this document) under NGB Contract DAHA90-94-D-0011, Delivery Order No. 0020.

2.0 BACKGROUND

The Old Burn Area (Site 11) was used by the Georgia ANG for fire-training exercises from 1940 until the property was sold to Gulfstream Aerospace Corporation in 1980. Petroleum products were pumped from a former aboveground storage tank farm, located approximately 250 ft southwest of the Old Burn Area, for fire-training activities. The Old Burn Area was also used for the disposal (burning) of fuels, waste chemicals, and equipment.

Previous investigations at the site indicate the presence of various petroleum hydrocarbons in site soils to a known depth of approximately 4 ft below ground surface (BGS) at the Old Burn Area and in the vicinity of the former aboveground storage tank. Concentrations of total petroleum hydrocarbons (TPH) detected in soils from the two areas ranged from non-detect to over 13,000 mg/kg. Groundwater samples collected from a monitoring well (MW11-1) downgradient of the burn pit exhibited elevated levels of volatile organics, polynuclear aromatic hydrocarbons (PAHs), and TPH. However, the extent of site groundwater contamination was not identified and groundwater remediation was not included within the Source Removal Project scope.

THIS PAGE INTENTIONALLY LEFT BLANK

3.0 SOURCE REMOVAL REQUIREMENTS

Under the ANG Installation Restoration Program (IRP), potential contamination at ANG installations and formerly-owned or used properties is investigated, and as necessary, site cleanup activities are implemented. Under this program, the ANG previously identified the Old Burn Area for removal, treatment, and disposal of contaminated soils. The remediation work at the site was conducted by AER incorporated in accordance with the following documents:

- The "Air National Guard Installation Restoration Program Contract Documents for Source Removal and Soil Treatment at Site 11," (Source Removal Specifications) (ANG 1996); and,
- The "Work Plan for Source Removal Actions at IRP Site 11" (OpTech 1996).

A preliminary remediation goal (cleanup objective) of non-detect for TPH in site soils was established by the ANG for the Source Removal Project.

THIS PAGE INTENTIONALLY LEFT BLANK

4.0 REMEDIATION ACTIVITIES

4.1 GENERAL SITE ACTIVITIES

Site mobilization activities were initiated on January 6, 1997. Mobilization activities included security briefings for key field personnel by the ANG Security and Gulfstream Security, mobilization of equipment to the site, including the site trailer, and establishment of the security guard at the perimeter fence.

4.2 EXCAVATION AND BACKFILLING OF PIT NO. 1

Excavation activities were initiated at the Old Burn Area (Pit No. 1) on January 9, 1997. The excavation was initiated in the approximate center of the known area of contamination. Field screening of soil samples was used to help further define the extent of contamination. Soil samples were collected from the pit floor and walls using the backhoe to collect a bucket of soil from the specified area. Soil samples were collected from the backhoe bucket using a decontaminated scoop and placed in Ziploc bags. The samples were allowed to equilibrate for a minimum of 15 minutes, and were then screened by placing the PID tip into the bag. Excavation was continued in a given area until samples screened "clean" (i.e., near background concentrations) via the field screening process. Confirmatory sampling was later conducted to confirm that the site soils were "clean" and that the remedial objectives had been achieved.

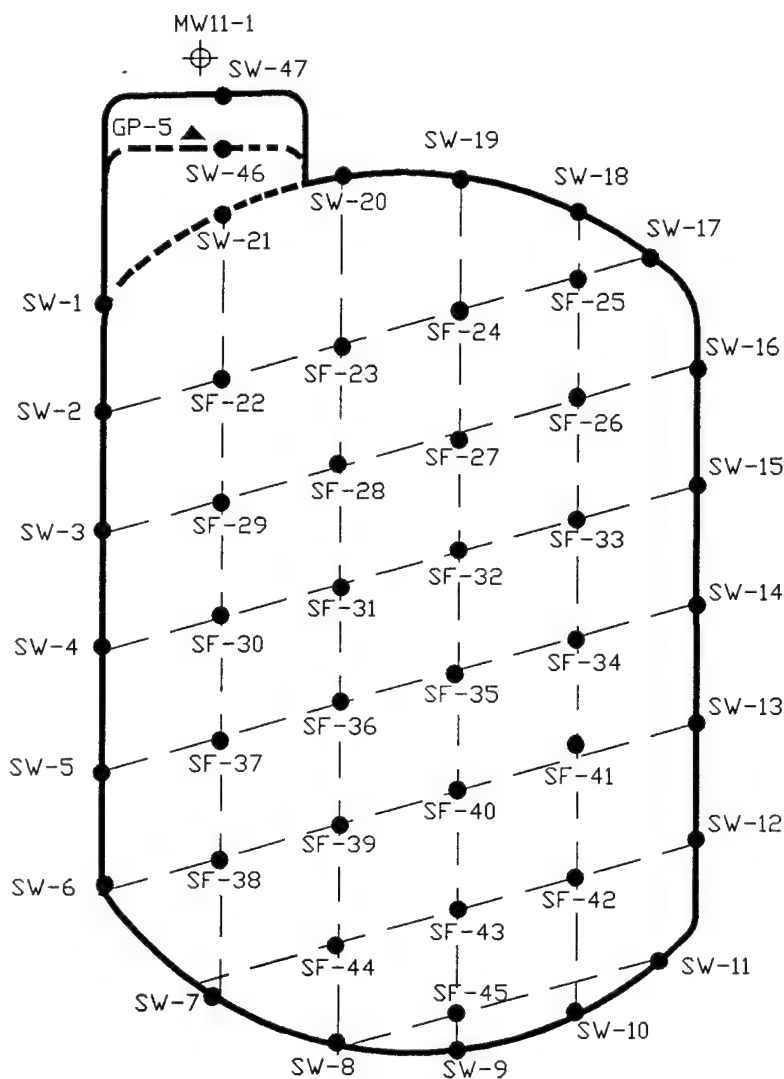
During the initial phases of the excavation at Pit No. 1, it was determined that the petroleum-related soil contamination extended to the groundwater elevation, located just below a "hard-pan"

layer, at approximately 7 to 12 ft BGS. Prior to the initiation of the source removal activities, the soil contamination had been estimated to extend 4 ft BGS. In accordance with the ANG requirements, soil excavation was not conducted below the groundwater elevation.

Excavated soil was directly loaded into dump trucks, covered, and transported to the Soil Safe facility in Savannah, Georgia for treatment (described in Section 4.4). Copies of the non-hazardous materials manifests are provided in Appendix A.

Initial excavation activities at Pit No. 1 were completed on January 22, 1997. Soil samples for laboratory analyses were collected on January 21 and 22, 1997. Sample locations are shown on Figure 4.1. Analytical results are discussed in detail in Section 5.

Based on the analytical results from Pit No. 1, three areas of concern were identified on the perimeter of the pit: two areas along Gulfstream IV Road, and one in the northwest corner of Pit No. 1. Because of the proximity of the excavation at Pit No. 1 to Gulfstream IV Road, additional excavation could not be completed without jeopardizing the structural integrity of the road bed. In order to further define the extent of the soil contamination beyond the pit side walls in the three areas of concern, a total of 10 soil probes were conducted in the unexcavated areas using a Geoprobe® direct push rig (Figures 4.1 and 4.2). Two soil samples were collected from each soil probe: one from the 3-ft to 4-ft BGS level; and one at the soil/hard pan interface (usually 7-ft to 12-ft BGS). Nine of the soil probes were conducted adjacent to the two areas along Gulfstream IV Road to define the contamination levels and extent beyond the pit side wall and extending



LEGEND

- APPROXIMATE FINAL EXCAVATION BOUNDARY
- SAMPLING GRID
- SOIL SAMPLING LOCATION AND IDENTIFIER
- ▲ GEOPROBE SAMPLING LOCATION AND IDENTIFIER
- PRELIMINARY EXCAVATION BOUNDARY

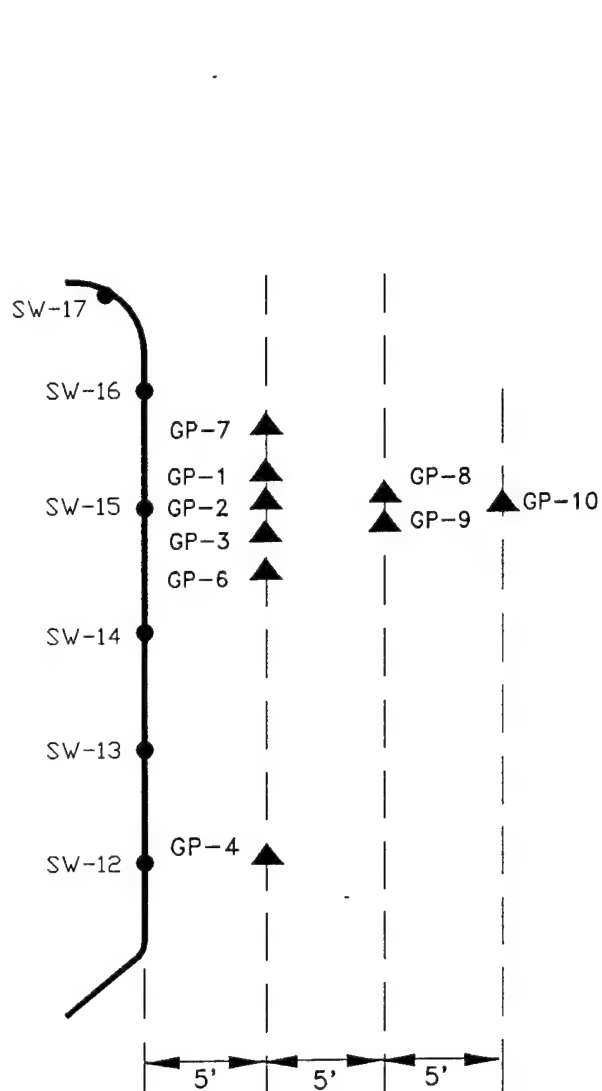
0 40'
SCALE IN FEET

FIGURE
4.1

PIT NO.1 SOIL SAMPLING LOCATIONS
GEORGIA AIR NATIONAL GUARD
SAVANNAH INTERNATIONAL AIRPORT
SAVANNAH, GEORGIA

PEER

PROJ./DISK: 1566-030
FILE: SAVH001C



LEGEND

- APPROXIMATE EXCAVATION BOUNDRY
- - - SAMPLING TRANSECTS
- SW-15 SOIL SAMPLING LOCATION AND IDENTIFIER
- ▲ GEOPROBE SAMPLING LOCATION AND IDENTIFIER

FIGURE
4.2

PIT NO.1 SOIL PROBE SAMPLING LOCATIONS
GEORGIA AIR NATIONAL GUARD
SAVANNAH INTERNATIONAL AIRPORT
SAVANNAH, GEORGIA

PEER

PROJ./DISK: 1566-030
FILE: SAVH001E

underneath Gulfstream IV Road. The remaining soil probe was conducted adjacent to the northwest corner of Pit No. 1 to determine the additional lateral extent of contamination in the vicinity of monitoring well MW11-1.

Based on the analytical results from the Geoprobe® soil sampling, additional soil contamination was determined to exist along the Pit No. 1 side wall area adjacent to Gulfstream IV Road.

However, the detectable levels of contamination extended only a few feet beyond the pit side wall. Due to the limited extent of the remaining petroleum contamination, and potential impacts from additional excavation to Gulfstream IV Road and Gulfstream site operations, the ANG directed that no further excavation be conducted along the pit side wall adjacent to Gulfstream IV Road.

The analytical results from the Geoprobe® soil samples collected in the vicinity of the northwest corner of Pit No. 1 indicated that detectable levels of contamination extended to less than a few feet beyond the pit side wall. The ANG directed additional excavation of the soils in the vicinity of the northwest corner (near sample location SW-21) to remove the remaining petroleum contamination. Additional excavation and confirmatory sampling was conducted in the northwest corner of Pit No. 1 on January 29, 1997.

Backfilling operations at Pit No. 1 were initiated on January 31, 1997. However, backfilling of the northwest corner of the pit was delayed pending the confirmatory sample results. The source removal specifications required backfill to be placed using a maximum of 12-in. lifts. However, due to the presence of water in the bottom of the pit, AER requested that an initial lift of 2 ft be placed to adequately cover the water. The ANG Project Manager and PEER Oversight

Representative concurred with the proposed revision. Subsequent backfill lifts were limited to 12-in. lifts. Backfill compaction was monitored by Whitaker Labs, Inc., using a nuclear density testing monitor. Backfill testing results are provided in Appendix B.

The analytical results for the confirmatory sample (SW-46) at the northwest corner of Pit No. 1 were received on February 3, 1997, and indicated some remaining contamination. On February 3, 1997, further excavation was conducted in the northwest corner of Pit No. 1 and an additional confirmatory sample (SW-47) was collected in the newly excavated area. The analytical results of the second confirmatory sample were received on February 6, 1997, and the results were non-detect for all parameters. Backfilling of the northwest corner was initiated on February 6, 1997.

Backfilling operations at Pit No. 1 were temporarily suspended on February 7, 1997, in order to initiate backfilling at Pit No. 2. Backfilling operations at Pit No. 1 resumed February 8, 1997, and were completed (to within 6 in. of the undisturbed grade) on February 12, 1997.

4.3 EXCAVATION AND BACKFILLING OF PIT NO. 2

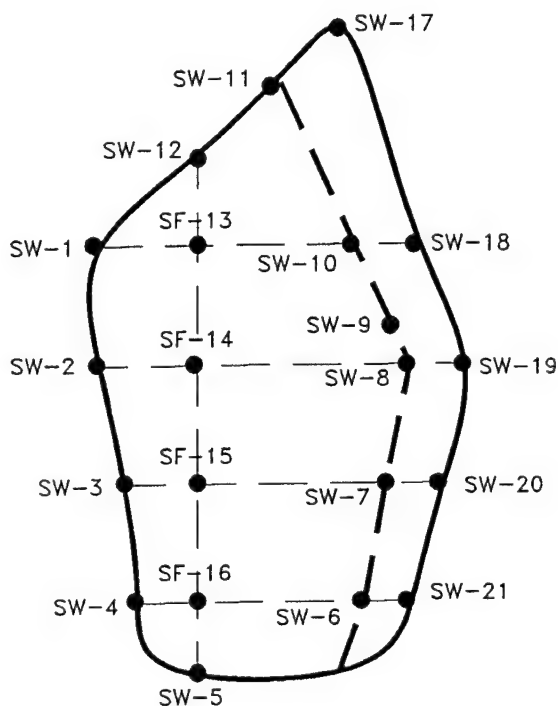
Excavation of the contaminated soils in the vicinity of the former aboveground storage tank (Pit No. 2) were initiated on January 23, 1997, and completed on January 24, 1997. Confirmatory soil samples for laboratory analyses were collected on January 24, 1997. Sample locations are shown on Figure 4.3.

Based on the analytical results from Pit No. 2, one area of concern was identified along the east wall of the pit. The ANG directed additional excavation of the soils along the east wall to remove the remaining petroleum contamination. Additional excavation and confirmatory sampling was conducted at Pit No. 2 on January 29, 1997.





The analytical results on the confirmatory samples along the east wall were received on February 3, 1997, and the results were non-detect for all parameters. Backfilling of Pit No. 2 was approved on February 3, 1997.

The source removal specifications required backfill to be placed using a maximum of 12-in. lifts. However, due to the presence of several inches of accumulated water in the bottom of the pit, AER requested that an initial lift of 2 ft be placed to adequately cover the water. The ANG Project Manager and PEER Oversight Representative concurred with the proposed revision. Subsequent backfill lifts were limited to 12-in. lifts.

Backfilling operations were initiated at Pit No. 2 on February 7, 1997 (operations at Pit No. 1 were temporarily suspended). Following completion of the first lift at Pit No. 2, backfilling operations switched back to Pit No. 1. Upon completion of the backfilling of Pit No. 1 (February 12, 1997), backfilling of Pit No. 2 was resumed, and was completed (to within 6 in. of the undisturbed grade) on February 13, 1997.



LEGEND

-  APPROXIMATE FINAL EXCAVATION BOUNDARY
-  SAMPLING GRID
-  SOIL SAMPLING LOCATION AND IDENTIFIER
SW-1
-  PRELIMINARY EXCAVATION BOUNDARY

0 40'
SCALE IN FEET

FIGURE
4.3

PIT NO. 2 SOIL SAMPLING LOCATIONS
GEORGIA AIR NATIONAL GUARD
SAVANNAH INTERNATIONAL AIRPORT
SAVANNAH, GEORGIA

PEER

PROJ./DISK: 1566-030
FILE:SAVH001H

4.4 OFF-SITE SOIL TREATMENT AND DISPOSAL

Excavated soils from both pits were transported via covered dump truck to the Soil Safe, Inc. treatment facility in Savannah, Georgia, located within 2 miles of the Old Burn Area. The Soil Safe facility uses a cold-mix micro-encapsulation process to produce a stable non-leachable soil cement from petroleum-contaminated soils, useable as a sub-base for various construction projects, such as paving projects. The process utilizes a pug mill to classify and segregate the source materials and to blend fixing agents with the contaminated soil for later use as soil cement. A copy of the Certificate of Recycle is provided in Appendix C.

4.5 SITE RESTORATION ACTIVITIES

Following the completion of the excavation of Pit No. 1 and Pit No. 2, clean topsoil placement was initiated on February 15, 1997. A minimum of 6 in. of topsoil was spread on the backfilled areas.

In accordance with the Source Removal Specifications, sod was to be used to restore the excavated areas to reduce the potential for the formation of dust or other debris which could damage adjacent aircraft. However, the final extent of the excavation and the adjacent areas impacted by the remediation operations was greater than that anticipated. To avoid increasing project costs for additional sod, the use of an asphaltic seed emulsion was approved by the ANG to restore the haul road area. The excavated areas and adjacent disturbed areas were restored with sod, and the asphaltic seed emulsion was used to restore the haul road area. Specifications for the asphaltic seed emulsion are provided in Appendix D.

Topsoil and sod placement, and asphaltic seeding was completed on February 25, 1997. Watering of the new sod and seeded areas was provided through mid-April 1997 to ensure the establishment of the sod and seeded areas.

4.6 FINAL SITE INSPECTION

On April 9, 1997, representatives from the ANG, Gulfstream, AER/Soil Safe, Inc., and PEER conducted a Final Inspection of the site. The excavated areas appeared level with no areas of settlement evident. The sod or seeded areas appeared well established, with the exception of a few small areas of brown and/or dead sod. No outstanding action items were identified. A copy of the Final Meeting Minutes is provided in Appendix E. Gulfstream indicated its acceptance of the work performed at Site 11 in a letter to the ANG dated June 9, 1997 (Appendix F).

5.0 ANALYTICAL LABORATORY RESULTS

A total of 47 confirmatory soil samples were collected from Pit No. 1 and 22 from Pit No. 2 (excluding duplicate samples). Twenty additional soil samples were collected from 10 direct-push soil probes from the perimeter areas of Pit. No. 1. Samples were analyzed by Savannah Analytical Services/Specialized Assays, Inc. for:

- Volatile organic compounds (Method 8240)
- Semivolatile organic compounds (Method 8270)
- TPH-GRO/DRO (Method 8015, modified); and
- Oil and grease (Method 9071).

Analytical data from the soil sampling conducted at Pit No. 1 are provided in Tables 5.1 and 5.2. Table 5.1 presents the analytical results for volatile organic compounds, TPH-GRO/DRO, and oil and grease. Semivolatile organic compounds with results above the method detection limit are provided in Table 5.2. Analytical data from the direct-push (Geoprobe®) soil sampling conducted adjacent to Pit No. 1 are provided in Table 5.3, and analytical data from Pit No. 2 are provided in Table 5.4. Quality assurance/quality control sampling analytical data are provided in Table 5.5. Laboratory reports are provided in Appendix G.

Table 5.1
Pit No. 1
Analytical Data Summary
Old Burn Area (Site 11)
Georgia Air National Guard Base
Savannah, Georgia

| Sample Number | Date | Volatile Organic Compounds | | | | Semivolatile Organic Compounds | | TPH-GRO (l) (mg/kg) | TPH-DRO (l) (mg/kg) | Oil and Grease (mg/kg) |
|---------------|----------|----------------------------|-------------------------|--------------------|--------------------|---|---|------------------------|------------------------|---------------------------|
| | | Benzene (mg/kg) | Ethylbenzene (mg/kg) | Toluene (mg/kg) | Xylenes (mg/kg) | Other Volatile Organic Compounds (mg/kg) | Semivolatile Organic Compounds (mg/kg) | | | |
| SW-1 | 01/21/97 | ND | ND | ND | ND | ND | ND | ND | ND | 63 |
| SW-2 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-3 | 01/21/97 | ND | ND | ND | ND | ND | ND | ND | ND | 16 |
| SW-4 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | 97 |
| SW-4 (DUP) | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | 120 |
| SW-5 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | 650 |
| SW-6 | 01/21/97 | ND | ND | ND | ND | ND | ND | ND | ND | 53 |
| SW-7 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-8 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | 34 |
| SW-9 | 01/21/97 | ND | ND | ND | ND | ND | ND | ND | ND | 64 |
| SW-10 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | 630 |
| SW-11 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | 620 |
| SW-12 | 01/22/97 | ND | 0.016 | ND | 0.13 | ND | ND | 28 | ND | 250 |
| SW-13 | 01/22/97 | ND | ND | ND | 0.005 | ND | ND | ND | ND | ND |
| SW-14 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | 220 |
| SW-15 | 01/22/97 | ND | 0.052 | 0.058 | 0.49 | (Note 2) | (Note 3) | 37 | 370 | 2800 |
| SW-16 | 01/22/97 | ND | ND | ND | 0.015 | ND | ND | ND | ND | ND |
| SW-16 (DUP) | 01/22/97 | ND | ND | ND | 0.044 | ND | ND | ND | ND | 300 |
| SW-17 | 01/21/97 | ND | 0.006 | ND | 1.5 | ND | ND | ND | ND | 57 |
| SW-18 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-19 | 01/21/97 | ND | ND | ND | ND | ND | ND | ND | ND | 47 |
| SW-20 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | 480 |
| SW-21 | 01/22/97 | ND | ND | ND | 0.014 | ND | ND | ND | 22 | 300 |
| SF-22 | 01/22/97 | ND | ND | ND | ND | ND | ND | 19 | 23 | 210 |
| SF-23 | 01/22/97 | ND | ND | ND | 0.055 | ND | ND | 150 | 100 | 1200 |
| SF-24 | 01/22/97 | ND | ND | ND | 0.083 | ND | ND | 26 | ND | 830 |
| SF-25 | 01/22/97 | ND | 0.010 | 0.006 | ND | ND | ND | 8.5 | ND | 310 |
| SF-26 | 01/22/97 | ND | ND | ND | ND | ND | ND | 4200 | 4400 | 9800 |
| SF-27 | 01/22/97 | ND | 4.0 | ND | 34 | ND | (Note 3) | 4400 | 6000 | 7100 |
| SF-28 | 01/22/97 | ND | 13 | 9.5 | 80 | ND | (Note 3) | 4400 | 4800 | 2400 |
| SF-29 | 01/22/97 | ND | ND | ND | 1.3 | ND | (Note 3) | 2000 | 1600 | 2200 |
| SF-30 | 01/22/97 | ND | ND | ND | 8.5 | ND | (Note 3) | 1900 | 1600 | 4900 |
| SF-30 (DUP) | 01/22/97 | ND | ND | ND | 8.8 | ND | (Note 3) | 2100 | 4700 | 3500 |
| SF-31 | 01/22/97 | ND | 4.5 | 6.0 | 33 | ND | (Note 3) | 5100 | 7100 | 14000 |
| SF-32 | 01/22/97 | ND | 19 | ND | 130 | ND | (Note 3) | 3300 | 3900 | 3700 |
| SF-33 | 01/22/97 | ND | 9.0 | 5.0 | 67 | ND | (Note 3) | | | |

Table 5.1
Pit No. 1
Analytical Data Summary
Old Burn Area (Site 11)
Georgia Air National Guard Base
Savannah, Georgia

| Sample Number | Date | Volatile Organic Compounds | | | | | Semi-volatile Organic Compounds (mg/kg) | TPH-GRO (1) (mg/kg) | TPH-DRO (1) (mg/kg) | Oil and Grease (mg/kg) |
|---------------|----------|----------------------------|----------------------|-----------------|-----------------|--|---|---------------------|---------------------|------------------------|
| | | Benzene (mg/kg) | Ethylbenzene (mg/kg) | Toluene (mg/kg) | Xylenes (mg/kg) | Other Volatile Organic Compounds (mg/kg) | | | | |
| SF-34 | 01/22/87 | ND | 6.0 | ND | 47 | ND | (Note 3) | 830 | 1400 | 7400 |
| SF-35 | 01/22/87 | ND | 10 | ND | 57 | ND | (Note 3) | 2300 | 1800 | 8100 |
| SF-36 | 01/22/87 | ND | 8.5 | 10 | 72 | ND | (Note 3) | 2400 | 2000 | 4700 |
| SF-37 | 01/22/87 | ND | ND | ND | ND | ND | (Note 3) | 170 | 680 | 2100 |
| SF-38 | 01/22/87 | ND | ND | ND | 0.005 | ND | ND | ND | ND | 130 |
| SF-39 | 01/22/87 | ND | 31 | 20 | 120 | ND | (Note 3) | 5100 | 6000 | 820 |
| SF-39 (DUP) | 01/22/87 | ND | 46 | 30 | 180 | (Note 4) | (Note 3) | 8400 | 1100 | 850 |
| SF-40 | 01/22/87 | ND | 0.009 | ND | ND | ND | ND | 12 | ND | 200 |
| SF-41 | 01/22/87 | ND | 6.3 | ND | 22 | ND | (Note 3) | 2200 | 4100 | 9100 |
| SF-42 | 01/22/87 | ND | 0.20 | 0.24 | 0.52 | ND | ND | 1800 | 1500 | 2600 |
| SF-43 | 01/22/87 | ND | ND | 0.012 | 0.044 | ND | ND | ND | ND | 110 |
| SF-44 | 01/22/87 | ND | ND | ND | ND | ND | ND | ND | ND | 3300 |
| SF-45 | 01/22/87 | ND | ND | ND | ND | ND | ND | ND | ND | 160 |
| SW-46 | 01/29/87 | ND | ND | ND | ND | ND | ND | 17 | ND | ND |
| SW-47 | 02/03/87 | ND | ND | ND | ND | ND | ND | ND | ND | ND |

NOTES :

ND = Non-detect above method detection limit.

(1) Project-specific cleanup objective for TPH = ND.

(2) 2-hexanone was also detected at a concentration of 0.10 mg/kg. Analytical results for other (non-listed) volatile organic compounds were below the method detection limits.

(3) One or more semi-volatile organic compounds were detected above the method detection limits. Analytical data for the detected semi-volatile organic compounds is provided in Table 5.2.

(4) 2-butanone was also detected at a concentration of 19 mg/kg. Analytical results for other (non-listed) volatile organic compounds were below the method detection limits.

Table 5.2
Pit No. 1
Analytical Results - Semivolatile Organic Compounds Data
Old Burn Area (Site 11)
Georgia Air National Guard
Savannah, Georgia

| Sample Number | Date | Semivolatile Organic Compounds | | | | | | | | Other Semivolatile Organics (mg/kg) |
|---------------|----------|--------------------------------|----------------------------|------------------|-----------------------------|---------------------|-----------------------|----------------------|------------------------------------|-------------------------------------|
| | | Dibenzofuran (mg/kg) | 2,6-Dinitrotoluene (mg/kg) | Fluorene (mg/kg) | 2-Methylnaphthalene (mg/kg) | Naphthalene (mg/kg) | 4-Nitrophenol (mg/kg) | Phenanthrene (mg/kg) | Bis(2-ethylhexyl)phthalate (mg/kg) | |
| SW-15 | 01/22/97 | ND | ND | ND | 0.55 | ND | ND | ND | ND | ND |
| SF-27 | 01/22/97 | 0.44 | ND | 0.42 | 17 | 8.0 | ND | ND | 1.8 | ND |
| SF-28 | 01/22/97 | 0.46 | ND | ND | 13 | 7.9 | 0.40 | ND | ND | ND |
| SF-29 | 01/22/97 | ND | ND | ND | ND | 0.53 | ND | ND | 0.65 | ND |
| SF-30 | 01/22/97 | ND | ND | ND | 2.9 | 1.3 | ND | ND | 1.1 | ND |
| SF-30 (DUP) | 01/22/97 | ND | ND | ND | 3.2 | 1.4 | ND | ND | 1.1 | ND |
| SF-31 | 01/22/97 | ND | ND | 0.37 | 14 | 8.2 | ND | 0.37 | 2.2 | ND |
| SF-32 | 01/22/97 | 0.47 | 1.52 | ND | 21 | 12 | ND | 6.13 | 7.5 | ND |
| SF-33 | 01/22/97 | 0.33 | ND | ND | 11 | 6.1 | ND | 0.55 | 1.9 | ND |
| SF-34 | 01/22/97 | ND | ND | 0.37 | 10 | 4.1 | ND | 0.88 | 0.41 | ND |
| SF-35 | 01/22/97 | ND | ND | ND | 8.2 | 3.6 | ND | 0.61 | ND | ND |
| SF-36 | 01/22/97 | ND | ND | ND | 7.8 | 3.8 | ND | 0.44 | 1.2 | ND |
| SF-37 | 01/22/97 | ND | ND | ND | 0.49 | ND | ND | ND | ND | ND |
| SF-39 | 01/22/97 | ND | ND | ND | 7.2 | 4.3 | ND | ND | ND | ND |
| SF-39 (DUP) | 01/22/97 | ND | ND | ND | 2.3 | 1.2 | ND | ND | ND | ND |
| SF-41 | 01/22/97 | ND | ND | 0.63 | 14 | 6.1 | ND | 1.1 | ND | ND |

NOTES:

ND = Non-detect above method detection limit.

Table 5.3
Pit No. 1 Geoprobe Soil Sampling
Analytical Data Summary
Old Burn Area (Site 11)
Georgia Air National Guard Base
Savannah, Georgia

| Sample Number | Date | Volatile Organic Compounds | | | | | Semivolatile Organic Compounds (mg/kg) | TPH-GRO (1) (mg/kg) | TPH-DRO (1) (mg/kg) | Oil and Grease (mg/kg) |
|-------------------|----------|----------------------------|----------------------|-----------------|-----------------|--|--|---------------------|---------------------|------------------------|
| | | Benzene (mg/kg) | Ethylbenzene (mg/kg) | Toluene (mg/kg) | Xylenes (mg/kg) | Other Volatile Organic Compounds (mg/kg) | | | | |
| GP-1 (3'-4') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| GP-1 (11'-12') | 01/27/97 | ND | 0.20 | ND | 0.17 | ND | ND | ND | ND | ND |
| GP-2 (3'-4') | 01/27/97 | ND | ND | ND | ND | ND | ND | 8.0 | ND | ND |
| GP-2 (11'-12') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| GP-3 (3'-4') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | 210 |
| GP-3 (7'-8') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| GP-4 (3'-4') | 01/27/97 | ND | ND | ND | ND | ND | ND | 11 | ND | 150 |
| GP-4 (9.5'-10.5') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | 150 |
| GP-5 (3'-4') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | 180 |
| GP-5 (5.5'-6.5') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| GP-6 (3'-4') | 01/27/97 | ND | ND | ND | ND | ND | ND | 5.5 | ND | ND |
| GP-6 (7.5'-8.5') | 01/27/97 | ND | ND | ND | ND | ND | ND | 5.6 | ND | ND |
| GP-7 (3'-4') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | 540 |
| GP-7 (8.5'-9.5') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| GP-8 (3'-4') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| GP-8 (9.5'-10.5') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | 83 |
| GP-9 (3'-4') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| GP-9 (10'-11') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| GP-10 (3'-4') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | 17 |
| GP-10 (10'-11') | 01/27/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |

NOTES:

ND = Non-detect above method detection limit.

(1) Project-specific cleanup objective for TPH = ND.

Table 5.4
Pit No.2
Analytical Data Summary
Old Burn Area (Site 11)
Georgia Air National Guard Base
Savannah, Georgia

| Sample Number | Date | Volatile Organic Compounds | | | | | Semivolatile Organic Compounds (mg/kg) | TPH-GRO (1) (mg/kg) | TPH-DRO (1) (mg/kg) | Oil and Grease (mg/kg) |
|---------------|----------|----------------------------|----------------------|-----------------|-----------------|--|--|---------------------|---------------------|------------------------|
| | | Benzene (mg/kg) | Ethylbenzene (mg/kg) | Toluene (mg/kg) | Xylenes (mg/kg) | Other Volatile Organic Compounds (mg/kg) | | | | |
| SW-1 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | 30 |
| SW-2 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-3 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-4 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | 30 |
| SW-5 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | 1100 |
| SW-5 (DUP) | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | 37 |
| SW-6 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | 320 |
| SW-7 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | 53 |
| SW-8 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | 30 |
| SW-9 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-10 | 01/24/97 | ND | ND | ND | ND | ND | ND | 10 | ND | ND |
| SW-11 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-12 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | 35 |
| SF-13 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | 190 | 250 |
| SF-14 | 01/24/97 | ND | ND | ND | 0.090 | ND | ND | ND | ND | 74 |
| SF-15 | 01/24/97 | ND | ND | ND | 0.020 | ND | ND | 76 | ND | 40 |
| SF-15 (DUP) | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | 27 |
| SF-16 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | 1200 |
| SW-17 | 01/29/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-18 | 01/29/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-19 | 01/29/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-20 | 01/29/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-21 | 01/29/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| SW-22 | 01/29/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |

NOTES:

ND = Non-detect above method detection limit.

(1) Project-specific cleanup objective for TPH = ND.

Table 5.5
QA/QC Samples
Analytical Data Summary
Old Burn Area (Site 11)
Georgia Air National Guard Base
Savannah, Georgia

| Sample Number | Date | Volatile Organic Compounds | | | | | Semivolatile Organic Compounds | | TPH-GRO (mg/kg) | TPH-DRO (mg/kg) | Oil and Grease (mg/kg) |
|---------------|----------|----------------------------|----------------------|-----------------|-----------------|--|--------------------------------|------|-----------------|-----------------|------------------------|
| | | Benzene (mg/kg) | Ethylbenzene (mg/kg) | Toluene (mg/kg) | Xylenes (mg/kg) | Other Volatile Organic Compounds (mg/kg) | | | | | |
| SW-4 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 97 |
| SW-4 (DUP) | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 120 |
| SW-16 | 01/22/97 | ND | ND | ND | 0.015 | ND | ND | ND | ND | ND | ND |
| SW-16 (DUP) | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 300 |
| SF-30 | 01/22/97 | ND | ND | ND | 8.5 | ND | (Note 1) | 2000 | 1600 | 1600 | 2200 |
| SF-30 (DUP) | 01/22/97 | ND | ND | ND | 8.8 | ND | (Note 1) | 1900 | 1600 | 1600 | 4900 |
| SF-39 | 01/22/97 | ND | 31 | 20 | 120 | ND | (Note 1) | 5100 | 6040 | 6040 | 820 |
| SF-39 (DUP) | 01/22/97 | ND | 48 | 30 | 180 | (Note 2) | (Note 1) | 9400 | 1100 | 1100 | 850 |
| SW-5 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 1100 |
| SW-5 (DUP) | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 37 |
| SF-15 | 01/24/97 | ND | ND | ND | 0.020 | ND | ND | 76 | ND | ND | 40 |
| SF-15 (DUP) | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 27 |
| TRIP BLANK | 01/21/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK | 01/22/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK | 01/22/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK | 01/22/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK | 01/22/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK | 01/24/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK | 01/24/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK | 01/24/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK | 01/24/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK # | 01/27/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK # | 01/27/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK | 01/29/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |
| TRIP BLANK | 02/03/97 | ND | ND | ND | ND | ND | ND | NA | NA | NA | NA |

Table 5.5
QA/QC Samples
Analytical Data Summary
Old Burn Area (Site 11)
Georgia Air National Guard Base
Savannah, Georgia

| Sample Number | Date | Volatile Organic Compounds | | | | Semivolatile Organic Compounds | | TPH-GRO (mg/kg) | TPH-DRO (mg/kg) | Oil and Grease (mg/kg) |
|---------------|----------|----------------------------|----------------------|-----------------|-----------------|--|--|-----------------|-----------------|------------------------|
| | | Benzene (mg/kg) | Ethylbenzene (mg/kg) | Toluene (mg/kg) | Xylenes (mg/kg) | Other Volatile Organic Compounds (mg/kg) | Semivolatile Organic Compounds (mg/kg) | | | |
| EQ BLK #1 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| EQ BLK #2 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| EQ BLK #3 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| FIELD BLK #1 | 01/22/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| FLD BLK #2 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| FLD BLK #3 | 01/24/97 | ND | ND | ND | ND | ND | ND | ND | ND | ND |

NOTES :

ND = Non-detect above method detection limits.

- (1) One or more semivolatile organic compounds were detected above the method detection limits. Analytical data for the detected semivolatile organic compounds is provided in Table 5.2.
- (2) 2-butanone was also detected at a concentration of 19 mg/kg. Analytical results for other (non-listed) volatile organic compounds were below the method detection limits.

5.1 PIT NO. 1

The soil sampling at Pit No. 1 included the collection of:

- 45 initial soil samples (21 samples were collected from the pit side walls (sample nos. SW-1 through SW-21); and 24 from the pit floor (sample no. SF-22 through SF-45);
- 20 samples collected from 10 direct push (Geoprobe®) soil probes; and,
- 2 additional soil samples from the pit side walls (sample no. SW-46 and SW-47).

Analytical data from the soil sampling conducted at Pit No. 1 are provided in Tables 5.1, 5.2, and 5.3. Sampling locations are shown on Figures 4.1 and 4.2.

5.1.1 Perimeter Sampling - Pit No. 1

The analytical results from the initial 21 pit side wall samples indicated that three soil samples exceeded the cleanup objective of non-detect for TPH.

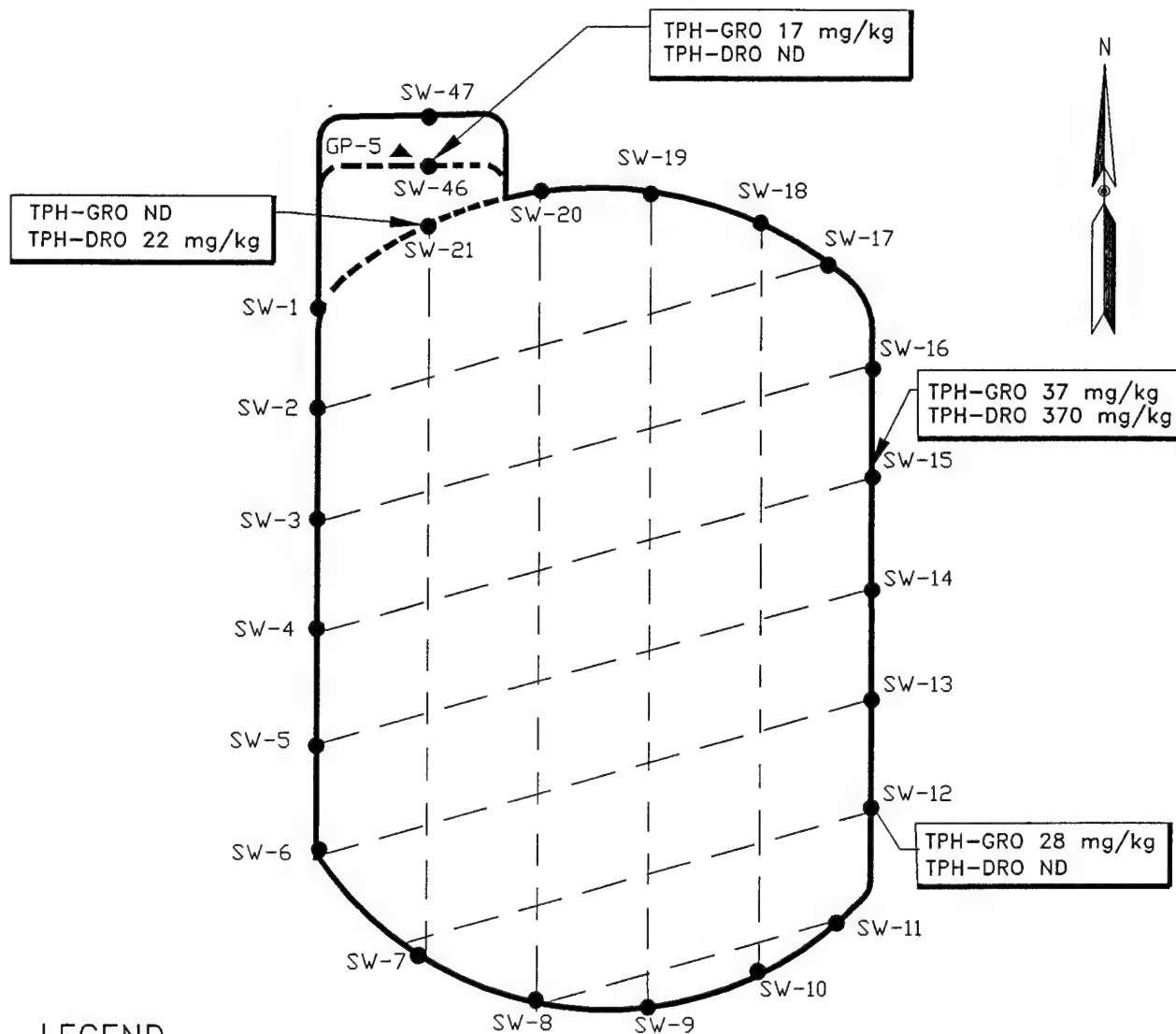
- TPH was detected at a concentration of 22 mg/kg TPH-DRO in soil sample SW-21, collected from the side wall of the northwest corner of Pit No. 1.

- TPH was also detected in two samples collected along the pit side wall adjacent to Gulfstream IV Road. TPH was detected at concentrations of 37 mg/kg TPH-GRO and 370 mg/kg TPH-DRO in sample SW-15 and at 28 mg/kg TPH-GRO in sample SW-12

The analytical results for TPH-GRO/DRO (above non-detect) for the samples from the pit side walls are shown on Figure 5.1

Results from five of the pit wall soil samples contained levels of several other parameters above the method detection limits. Parameters detected above the method detection limits included ethylbenzene, toluene, xylenes, 2-hexanone (a volatile organic compound), oil and grease, and 2-methylnaphthalene (a semivolatile organic compound). The analytical results for the pit side walls for these parameters are shown on Figure 5.2. Although a specific cleanup criteria was not established for these parameters, the data was used in evaluating the completeness of the excavation.

- Ethylbenzene was detected in three soil samples from the pit side walls collected along Gulfstream (SW-12, SW-15, and SW-17). Concentrations of ethylbenzene from the three samples ranged from 0.006 mg/kg (SW-17) to 0.052 mg/kg (SW-15).
- Toluene was detected in one pit side wall sample, SW-15, at a concentration of 0.058 mg/kg.



LEGEND

- APPROXIMATE FINAL EXCAVATION BOUNDARY
- - - SAMPLING GRID
- SOIL SAMPLING LOCATION AND IDENTIFIER
SW-3
- ▲ GEOPROBE SAMPLING LOCATION AND IDENTIFIER
GP-5
- - - PRELIMINARY EXCAVATION BOUNDARY

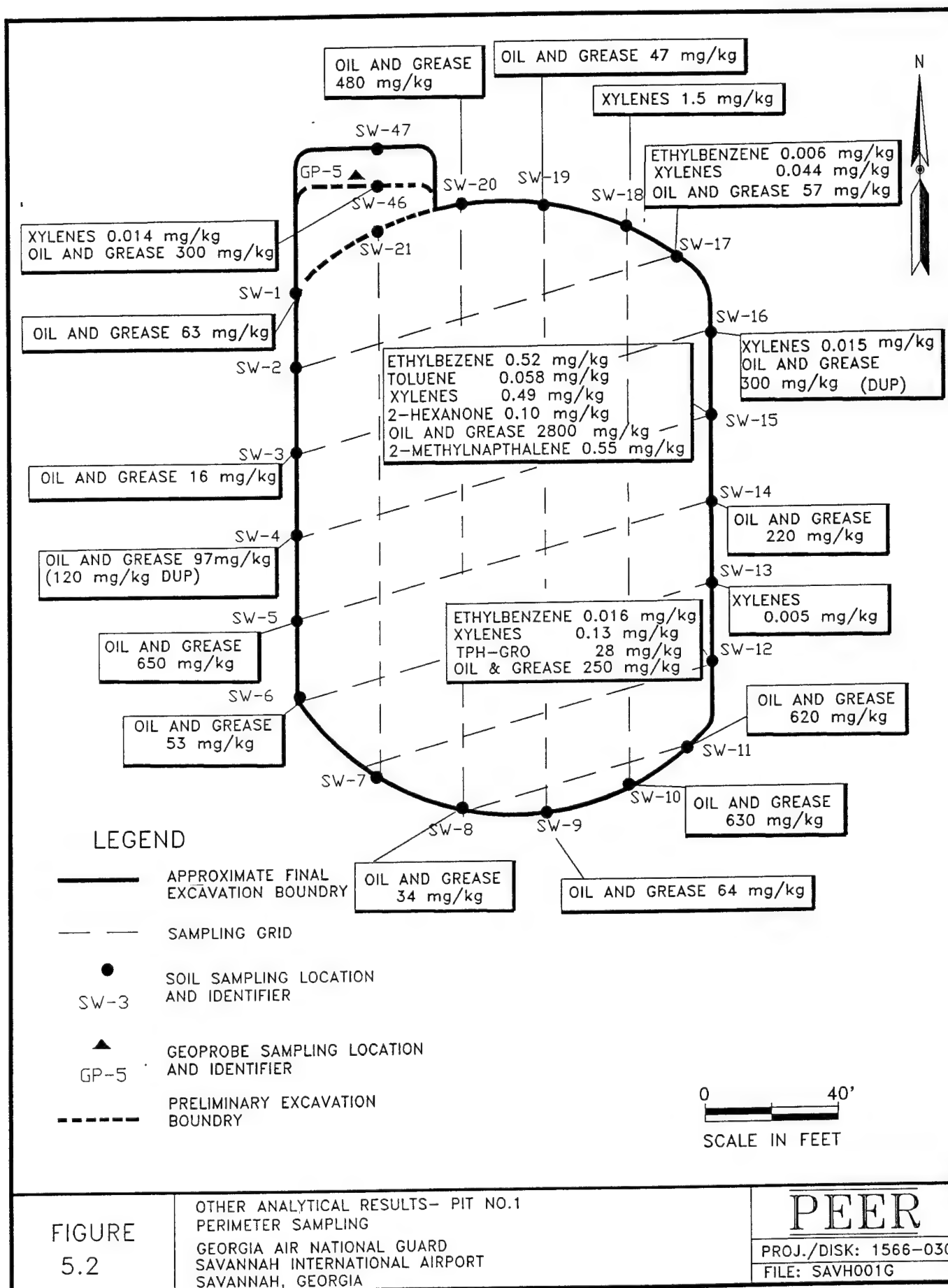
0 40'
SCALE IN FEET

FIGURE
5.1

TPH ANALYTICAL RESULTS-PIT NO.1
PERIMETER SAMPLING
GEORGIA AIR NATIONAL GUARD
SAVANNAH INTERNATIONAL AIRPORT
SAVANNAH, GEORGIA

PEER

PROJ./DISK: 1566-030
FILE: SAVH001F



- Xylenes were detected in seven pit side wall soil samples (SW-12, SW-13, SW-15, SW-16, SW-17, SW-18, and SW-21). Concentrations of xylenes from the seven samples ranged from 0.005 mg/kg (SW-13) to 1.5 mg/kg (SW-18).
- 2-hexanone was detected in one pit side wall sample, SW-15, at a concentration of 0.10 mg/kg.
- Concentrations of oil and grease were reported above the method detection limit for 17 of the pit side wall samples, with concentrations ranging from 16 mg/kg (SW-3) to 2800 mg/kg (SW-15).
- 2-methylnaphthalene was detected in one pit side wall sample, SW-15, at a concentration of 0.55 mg/kg.

Based on the analytical, three areas of concern were identified in Pit No. 1: two areas along Gulfstream IV Road (sample locations SW-15 and SW-12), and one in the northwest corner of Pit No. 1 (sample location SW-21). To further delineate the extent of the contamination in the three areas of concern prior to further excavation, 10 soil probes were conducted using a Geoprobe® direct push rig. Eight of the soil probes (GP-1 through GP-3, GP-6 through GP-10) were conducted in the vicinity of sample location SW-15, one (GP-4) was conducted adjacent to sample location SW-12, and one (GP-5) near sample location SW-21. Two soil samples were collected from each soil probe: one from the 3-ft to 4-ft level; and one at the soil/hard pan

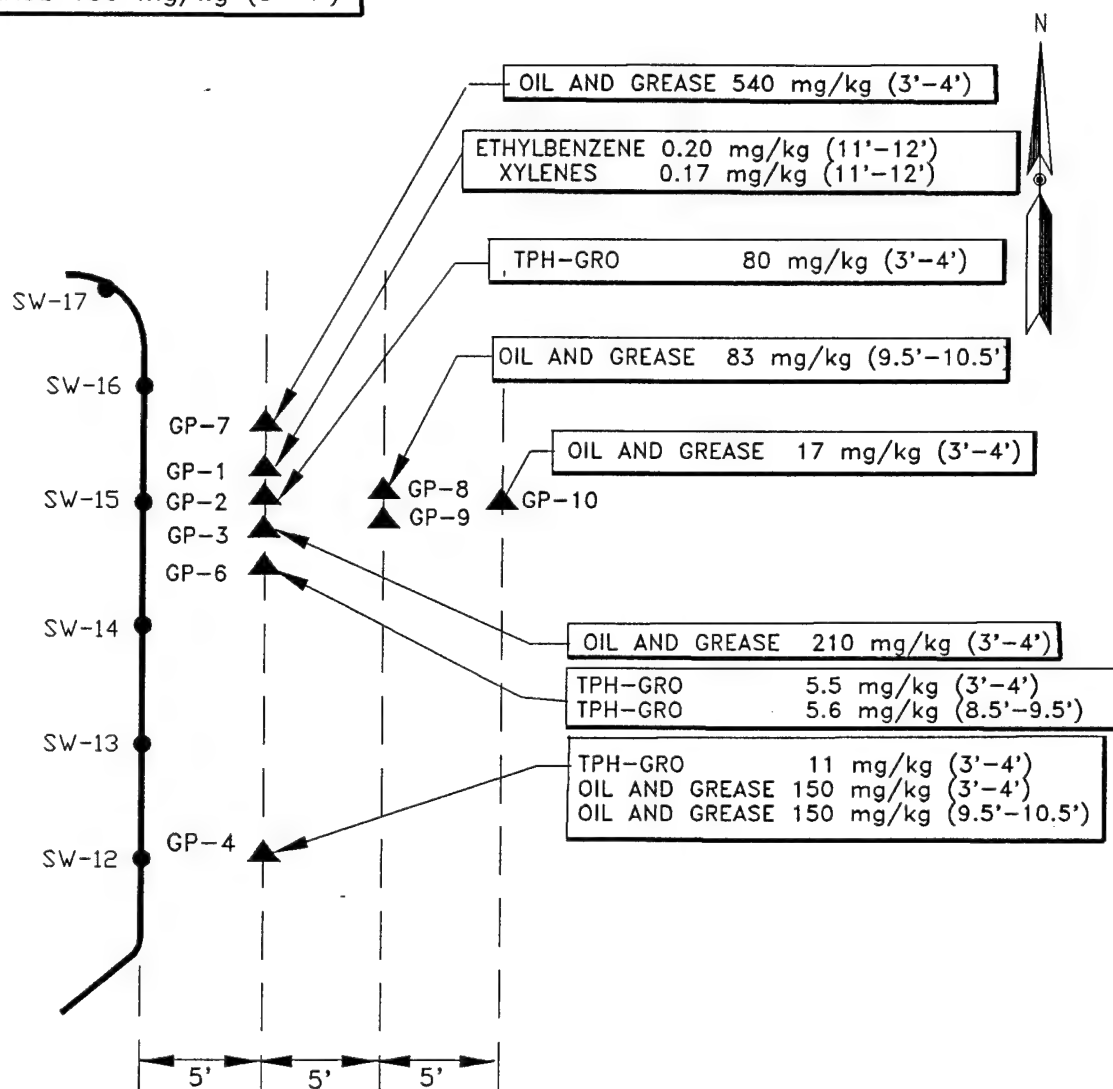
interface (usually 7-ft to 12-ft BGS). Analytical results for the Geoprobe® soil sampling are provided in Table 5.3, and as shown on Figure 5.3.

Soil probe GP-4 was conducted adjacent to soil sample location SW-12, approximately 10-ft from the pit wall. TPH concentrations were 11 mg/kg TPH-GRO in the sample collected from 3 to 4-ft BGS, and non-detect TPH-GRO/DRO from the soil/hardpan interface sample. Results for all other parameters except for oil and grease, were non-detect. Oil and grease were detected in both soil samples at a concentration of 150 mg/kg.

In the area adjacent to soil sample location SW-15, five soil probes were conducted at 10-ft intervals along a transect, located approximately 5-ft from, and parallel to the pit side wall (GP-1 through GP-3, GP-6, and GP-7). Two of the soil probes (GP-8 and GP-9) were located approximately 10-ft from the pit side wall, and one soil probe (GP-10) was located in Gulfstream IV Road. Soil samples from soil probe GP-1, GP-3, and GP-7 through GP-10 were non-detect for TPH-GRO/DRO. A concentration of 8.0 mg/kg TPH-GRO was reported from the sample collected from soil probe GP-2 at a depth of 3 to 4 ft BGS, and non-detect for TPH-GRO/DRO from the soil/hardpan interface sample. In the sample from soil probe GP-6, TPH-GRO was reported at a concentration of 5.5 mg/kg in the sample from 3 to 4-ft BGS and 5.6 mg/kg from the sample from the soil/hardpan interface. Other parameters detected in the soil probe samples from this area included ethylbenzene (0.20 mg/kg) and toluene (0.17mg/kg) in the sample from the soil/hardpan interface at GP-1, and oil and grease in five of the samples, with concentrations ranging from non-detect to 540 mg/kg.

GP-5

OIL AND GREASE 180 mg/kg (3'-4')



LEGEND

- APPROXIMATE EXCAVATION BOUNDRY
- — — SAMPLING TRANSECTS
- SW-15 SOIL SAMPLING LOCATION AND IDENTIFIER
- ▲ GEOPROBE SAMPLING LOCATION AND IDENTIFIER

FIGURE
5.3

ANALYTICAL RESULTS— SOIL PROBE SAMPLING AT PIT NO. 1

GEORGIA AIR NATIONAL GUARD
SAVANNAH INTERNATIONAL AIRPORT
SAVANNAH, GEORGIA

PEER

PROJ./DISK: 1566-030
FILE:SAVH001D

Based on the analytical results from the Geoprobe® soil sampling, additional soil contamination was determined to exist along the Pit No. 1 side wall area adjacent to Gulfstream IV Road, and that detectable levels of contamination extended only a few feet beyond the pit side wall. Based on the limited extent of the remaining petroleum contamination, and potential impacts from additional excavation to Gulfstream IV Road and Gulfstream site operations, the ANG directed no further excavation along the pit side wall adjacent to Gulfstream IV Road.

Soil probe GP-5 was conducted approximately 10-ft from the pit wall adjacent to soil sampling location SW-21 in the northwest corner of the pit. TPH results (and all other parameters except oil and grease) were non-detect for both samples from soil probe GP-5. Oil and grease was detected in the sample from 3 to 4-ft BGS at GP-5 at a concentration of 180 mg/kg. Based on the Geoprobe® soil sampling results, the lateral extent of the additional contamination in the northwest corner of the excavation was determined to be less than 10-ft. . The ANG directed additional excavation of the soils in the vicinity of the northwest corner (near sample location SW-21) to remove the remaining petroleum contamination.

Following completion of the additional excavation in the northwest corner (SW-21), an additional soil sample (SW-46) was collected. Results indicated the presence of TPH-GRO at a concentration of 17 mg/kg. Analytical results for all other parameters for this sample were non-detect. Additional excavation was conducted in the vicinity of the northwest corner, and another soil sample was collected (SW-47). Results from the soil sample were non-detect for TPH-GRO/DRO and all other parameters.

5.1.2 Pit Floor Sampling - Pit No. 1

A total of 24 samples were collected from the floor of Pit No. 1. The analytical results indicated that TPH concentrations in 39 samples exceeded the cleanup objective of non-detect. Analytical results for Pit No. 1 are provided in Tables 5.1 and 5.2. TPH-GRO concentrations (above non-detect) ranged from 8.5 mg/kg (SF-26) to 9,400 (SF-39(DUP)) mg/kg. TPH-DRO concentrations ranged from 23 mg/kg (SF-22) to 7,100 mg/kg (SF-32). Other parameters detected in the pit floor samples included oil and grease, ethylbenzene, toluene, xylenes, 2-butanone (a volatile organic compound), and several semivolatile organic compounds.

5.2 PIT NO. 2

The soil sampling at Pit No. 2 included the collection of:

- 16 initial soil samples (12 samples were collected from the pit side walls (sample no. SW-1 through SW-12); and 4 from the pit floor (sample no. SF-13 through SF-16);
and
- 6 additional soil samples from the pit side wall (sample no. SW-17 through SW-22).

Analytical data from the soil sampling conducted at Pit No. 2 are provided in Table 5.4. Sampling locations are shown on Figure 4.2.

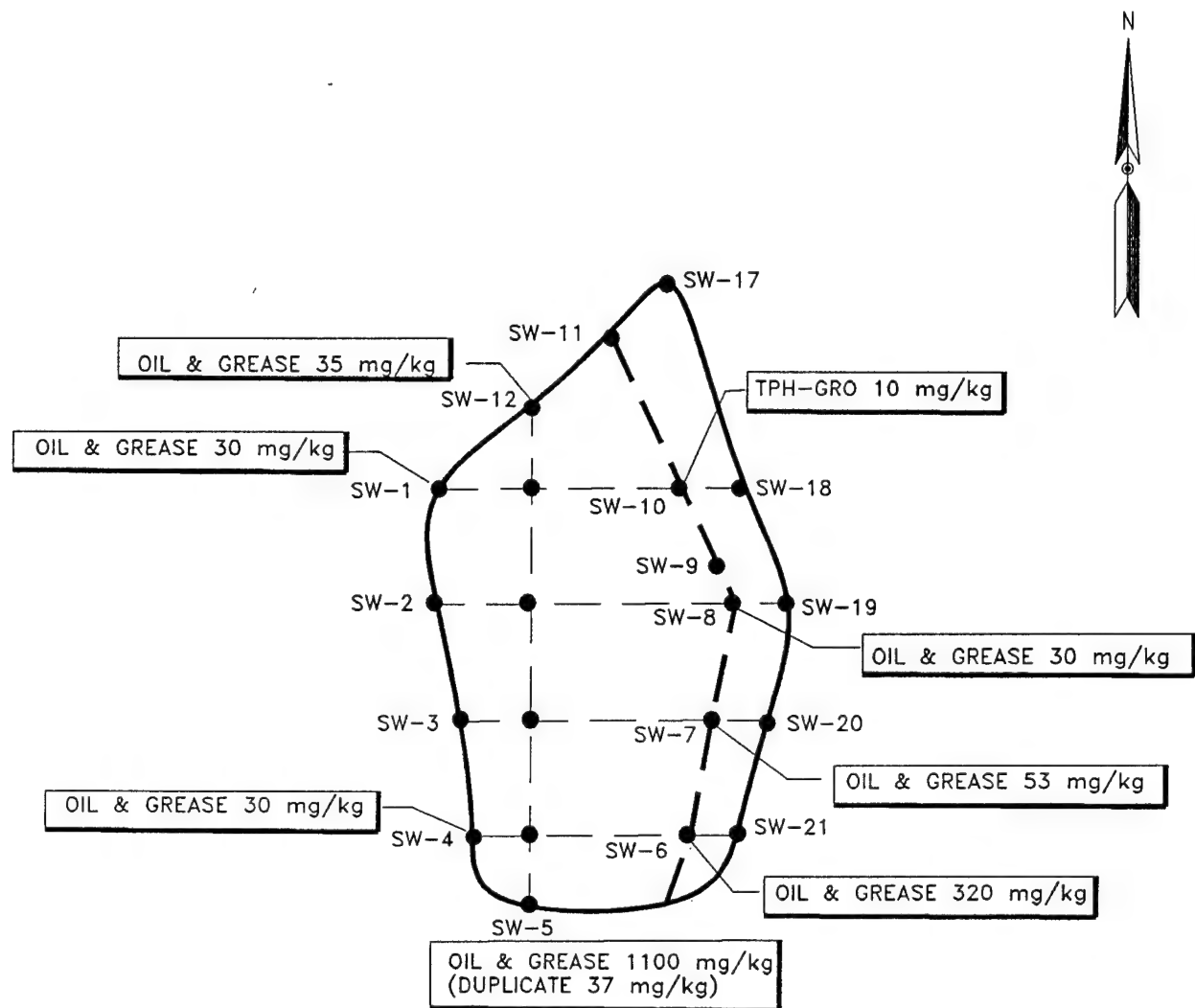
5.2.1 Perimeter Sampling - Pit No. 2

The analytical results from the initial 12 pit side wall samples indicated that one soil sample exceeded the cleanup objective of non-detect for TPH.





- TPH was detected at a concentration of 10 mg/kg TPH-GRO in soil sample SW-10, collected from eastern side wall of Pit No. 2.

All other parameters except for oil and grease were non-detect for the 12 pit side wall samples. Oil and grease concentrations were report above the method detection limit in 8 of the 12 pit side wall samples. Concentrations ranged from 30 mg/kg (SW-1, SW-4, and SW-8) to 1100 mg/kg (SW-5). The analytical results for the samples from the pit side walls are shown on Figure 5.4.

Based on the analytical results and the one pit side wall sample that exceeded the TPH cleanup objective, one area of concern was identified along the eastern perimeter of Pit No. 1. Additional excavation was conducted along the area of concern, and six additional confirmatory samples were collected (SW-17 through SW-21). The analytical results for TPH-GRO/DRO and all other parameters were below the method detection limits.



LEGEND

-  APPROXIMATE FINAL EXCAVATION BOUNDARY
-  SAMPLING GRID
-  SOIL SAMPLING LOCATION AND IDENTIFIER
-  PRELIMINARY EXCAVATION BOUNDARY

0 40'
SCALE IN FEET

FIGURE
5.4

ANALYTICAL RESULTS--PIT NO. 2 PERIMETER SAMPLING
GEORGIA AIR NATIONAL GUARD
SAVANNAH INTERNATIONAL AIRPORT
SAVANNAH, GEORGIA

PEER

PROJ./DISK: 1566-030
FILE::SAVH001J

5.2.2 Pit Floor Sampling - Pit No. 2

A total of four soil samples were collected from the floor of Pit No. 2 (SF-13 through SF-16). Results for two of the samples exceeded the cleanup objective of non-detect for TPH. A concentration of 190 mg/kg TPH-DRO was detected in sample SF-13, and 76 mg/kg TPH-GRO in sample SF-15. The analytical results for two of the samples (SF-14 and SF-16) were non-detect for TPH-GRO/DRO. Other parameters detected in the pit floor samples included oil and grease, and xylenes.

5.3 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Additional samples were collected throughout the remedial activities for quality assurance/quality control (QA/QC) purposes. QA/QC samples included duplicate samples, trip blanks field blanks, and equipment blank samples. Analytical results for QA/QC samples are provided in Table 5.5.

Duplicate Samples - Duplicate samples were collected at a frequency of 10% throughout the soil sampling to provide an estimate of sample analytical variability. Duplicate samples were analyzed for:

- Volatile organic compounds
- Semivolatile organic compounds
- TPH-GRO/DRO; and
- Oil and grease.

A total of six soil duplicate samples were collected. Four duplicate samples were collected from Pit No. 1 (SW-4 (DUP), SW-16(DUP), SF-30(DUP), and SF-39(DUP), and two duplicate samples were collected from Pit No. 2 (SW-5 (DUP) and SF-15(DUP). Results for most of the duplicate samples were relatively consistent with the base sample result. However, some notable differences were observed:

- Oil and grease were reported at a concentration of 300 mg/kg in SW-16(DUP) versus non-detect in SW-16 (Pit No. 1).
- Oil and grease were reported at a concentration of 4900 mg/kg in SF-30 (DUP) and 2,200 mg/kg in SF-30 (Pit No. 1).
- Oil and grease were reported at a concentration of 37 mg/kg in SW-5 (DUP) and 1100 mg/kg in SW-5 (Pit No. 2).
- TPH-GRO was reported at a concentration of non-detect in SF-15 (DUP) and 76 mg/kg in SF-15 (Pit No. 2).

The observed differences in the duplicate results reflect the heterogeneity of the site soils.

Trip Blank Samples - A trip blank sample, consisting of analyte-free water supplied by the analytical laboratory was included in each shipment of samples (i.e., each cooler) to monitor for cross-contamination. Trip blank samples were analyzed for volatile organic compounds. A total

of 13 trip blank samples were analyzed as part of the sampling program. Results for all samples were non-detect, indicating that the reported analytical results for the soil sampling were not a result of cross-contamination during the sampling/ shipping process.

Field/Equipment Blank Samples - A total of three field blank samples and three equipment blank samples were collected as part of the QA/QC sampling program. Field blank samples were collected from the analyte-free rinse water used in the decontamination process. Equipment blank samples were collected from the final rinse of the sampling equipment. The samples were analyzed for:

- Volatile organic compounds
- Semivolatile organic compounds
- TPH-GRO/DRO; and
- Oil and grease.

Results for all parameters were non-detect, indicating that any contamination detected in the soil samples was not a result of cross-contamination during the sample collection process.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analytical data from the confirmatory soil samples as described in Section 5.0, the main source areas of petroleum contamination at Site 11 above the site-specific action limit (non-detect for TPH-GRO/DRO) appear to have been removed above the groundwater table. Due to the presence of Gulfstream IV Road, a small area of contamination remains between Pit No. 1 extending less than 10 ft east underneath Gulfstream IV Road, with concentrations ranging from non-detect to 37 mg/kg TPH-GRO and 370 mg/kg TPH-DRO.

Therefore, no further significant source area exists at Site 11 and additional soil remediation activities are not recommended.

THIS PAGE INTENTIONALLY LEFT BLANK

7.0 REFERENCES

ANG 1996, "Air National Guard Installation Restoration Program Contract Documents for Source Removal and Soil Treatment at Site 11," 1996.

OpTech, "Work Plan for Source Removal Actions at IRP Site 11," 1996.

THIS PAGE INTENTIONALLY LEFT BLANK